

Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from http://www.ramsar.org/ris/key_ris_index.htm.

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

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Designation date

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Site Reference Number

2. Date this sheet was completed/updated:

January 25, 2010

3. Country:

United States of America

4. Name of the Ramsar site:

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Laguna de Santa Rosa Wetland Complex

5. Designation of new Ramsar site or update of existing site:

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or
b) Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or
ii) the boundary has been extended ; or

iii) the boundary has been restricted**

and/or

If the site area has changed:

i) the area has been measured more accurately ; or

ii) the area has been extended ; or

iii) the area has been reduced**

**** Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

i) a hard copy (required for inclusion of site in the Ramsar List): ;

ii) an electronic format (e.g. a JPEG or ArcView image) ;

iii) a GIS file providing geo-referenced site boundary vectors and attribute tables .

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The Laguna de Santa Rosa Wetland Complex area includes an array of public parcels under a variety of conservation designations (Department of Fish and Game wildlife areas, conservation or mitigation banks, public parcels with conservation easements, parcels directly owned by conservation organizations, Sonoma County Water Agency (mainly applies to waterways & riparian zones) or other resource managers). The area also includes several properties in private ownership with or without conservation easements in place. We overlaid several GIS layers reflecting high biotic and conservation value in order to determine this site delineation.

8. Geographical coordinates (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

Approximate central point of total area: 38°24' N 122°47' W

9. General location:

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The Laguna de Santa Rosa Wetland Complex is located in Sonoma County, California, west of the City of Santa Rosa (pop. 150,000), east of Sebastopol (pop. 7,500), and 78 km (50 miles) north of San Francisco (pop. 750,000). The site is situated within the Laguna de Santa Rosa watershed, with the Laguna de Santa Rosa being the largest tributary to the Russian River due North. The Russian River drains into the Pacific Ocean ~50 km due West.

10. Elevation: (in metres: average and/or maximum & minimum)

The Laguna de Santa Rosa Wetland Complex is located at an average elevation of 22.87 m above sea level. The minimum elevation is 14.02 m and the maximum elevation is 58.23 m.

11. Area: (in hectares)

The Laguna de Santa Rosa Wetland Complex size is 1576 hectares

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland. The Laguna de Santa Rosa Wetland Complex is composed of seasonal and perennial freshwater wetlands containing perennial and seasonal creeks, ponds, marshes, vernal pools and swales, floodplains, riparian forests, oak woodlands, and grasslands. Vernal pools are temporary seasonal wetlands that once occurred throughout California grasslands, providing habitat for many rare endemic organisms. The Santa Rosa Plain, immediately east of the Laguna de Santa Rosa, contains the remaining 15% of this unique habitat type in the region, lost in recent decades due to changes in land use. The permanent waterways, marshes and floodplain of the Laguna de Santa Rosa capture and slow the storm waters that drain the entire watershed each winter and provide year round habitat for local and migrating wildlife and the drainage likely functions as an important wildlife corridor and refuge for animals. The site is situated within the California Floristic Province, a globally recognized biotic ‘hotspot’, and so harbors many unique and rare and endangered plants. Besides its areas of high biotic value the Laguna watershed is also home to the majority of Sonoma County’s human population, which relies upon the Laguna wetlands complex for flood control, scenic beauty, and recreation. Due to the eminent biotic value and simultaneous proximity to human uses the conservation of this area is extremely important. A list of parcels included in the Ramsar Site is provided in Appendix A.

13. Ramsar Criteria:

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Criterion 1: Representative, rare, or unique wetlands:

A central reason for the Laguna de Santa Rosa Wetland Complex’s biological diversity is due to the various types of rare, or unique wetlands: vernal pools and swales, freshwater marshes, seasonal flood plains and perennial creeks and streams lined with Riparian vegetation all support different plant and wildlife communities (Honton & Sears 2006).

The Laguna de Santa Rosa Wetland Complex is globally significant as it represents freshwater wetland systems in the Mediterranean biogeographic region. Mediterranean-type ecosystems have recently been identified as the second most at-risk biome worldwide, second only to the grassland biome, also represented in the LSRP wetland complex as oak savannah vernal pool grasslands. As with most Mediterranean-type areas around the world, wetlands in California have

been hit especially hard as the State has witnessed over a 90% loss in wetlands, particularly exemplified by the decline and impairment of the major freshwater wetland systems like those once found in the Great Central Valley and the Owen's Valley. The Laguna de Santa Rosa Wetland Complex is one the largest wetlands remaining in California, yet it too still faces a myriad of threats.

Laguna de Santa Rosa Floodplain and Creeks

The Laguna de Santa Rosa is the largest tributary of the Russian River. The sinuous watercourse and associated wetlands form a significant floodplain during the heavy winter rains, capable of storing over 80,000 acre feet (99,000,000 m³) of storm water annually. This is important in preventing major floods down stream in the Russian River drainage that the Laguna is the largest tributary of. Principal tributary streams rise on the southern slopes of the Sonoma and Mayacamas Mountains Largest such as Mark West Creek, Santa Rosa Creek, Copeland Creek, Hinebaugh Creek, Five Creek, Washoe Creek and Blucher Creek. In the dry summer season the Laguna consists of a winding ribbon of flow and a massive floodplain that resembles a series of lakes in the winter storm season. There are numerous vernal pools on the floodplain and the abutting Santa Rosa Plain oak savannah vernal pool grasslands that extend for miles to the east, and support many rare and endangered species.

Seasonal Wetlands

Vernal pools and swales, an increasingly rare habitat type, are seasonal wetlands that are distinctive of the Mediterranean biogeographic region, and once occurred throughout California grasslands, providing habitat for many rare and endemic organisms. Vernal pools form in depressions in the landscape where rainfall collects during the winter and slowly evaporates over the summer. The wet-then-dry fluctuations year after year dictate the species that have evolved to live in this temporal environment. In California, vernal pools are home to numerous threatened and endangered species, many of which thrive annually in a brief window of time when pools are wet and temperatures are warm. Springtime in a vernal pool landscape boasts a display of color and life in small hot-spots of biodiversity. Endangered annual plants flower and set seed for subsequent years, endangered amphibians lay eggs in the evaporating pool water, and solitary bees prospect for pollen to assure their next generation and pollinate highly co-evolved annual plant species.

In Sonoma County, California, the Santa Rosa Plain, a 2500 acre expanse of seasonal wetland habitat, has lost 85% of its vernal pools (CH2M Hill 1990). Losses are largely due to shifts in land use and land management as the county changes from a rural, diverse agricultural region to one of major urban centers and intensive agriculture. Home and business construction as well as the conversion of grazing lands to vineyards are chiefly responsible for the destruction of vernal pools to date. With many remaining vernal pool habitats entering into conservation, larger scale issues such as climate change and the spread of invasive noxious weeds pose a future threat to the survival of vernal pool ecosystems and the endangered species they accommodate.

Cunningham Marsh

Cunningham Marsh is a unique permanent freshwater marsh that still supports remnants of a historically rich and distinctive regional wetland flora, including endangered plant species and many disjunct populations of plants typical of northern bog-like habitats. Most well known is the state and federally endangered Pitkin Marsh lily (*Lilium pardalinum ssp. pitkinense*), which survives at the edge of the riparian wetlands and is known only from this location and from its

nearby namesake, Pitkin Marsh. Cunningham Marsh also serves as habitat for migrating and nesting bird species, dense cover for a variety of wildlife, a travel corridor, and potential habitat for the endangered California freshwater shrimp (*Syncaris pacifica*), which is documented immediately downstream in Blucher Creek.

Riparian Zones

Riparian habitat in California has been reduced to just 2 % of what it was a century ago. Existing riparian habitat still extends along ~70 kilometers of the Laguna de Santa Rosa and its tributaries. Mark West and Santa Rosa Creeks are the two largest tributaries of the lower Laguna de Santa Rosa, and are habitat to two endangered anadromous fish species: Coho Salmon (*Oncorhynchus kisutch*) and Steelhead trout (*Oncorhynchus mykiss*).

Criterion 2: Supports vulnerable, endangered, or critically endangered species or threatened ecological communities:

The Laguna de Santa Rosa Wetland Complex is habitat to several animals, plants, or plant communities considered rare, threatened or endangered by national, state and international legislation. The Santa Rosa Plain vernal pool complex has an ecologically distinctive flora and fauna. The unique community includes four plant species that are listed on both the U.S. Federal and the State of California's endangered species list. Three of these four plants are endemic and occur primarily on the Santa Rosa Plain of Sonoma County.

Listed endangered, threatened or special concern plants native to the Laguna de Santa Rosa Wetland Complex include:

Sonoma sunshine (*Blennosperma bakeri*) is restricted to remaining vernal pool habitats within the Santa Rosa Plain and Sonoma Valley, Sonoma County. According to the [California Natural Diversity Database](#) and the Laguna de Santa Rosa Foundation [Vernal Pool Survey](#) database, there are currently 23 extant occurrences, while approximately 30 percent of the historic occurrences have been eliminated or seriously damaged. Most of the remaining sites are threatened by urbanization, wastewater effluent irrigation, agricultural land conversion, and competition from non-native invasive species. Westward expansion of the City of Santa Rosa threatens at least half the remaining habitat (USFWS 1991).

Sebastopol meadowfoam (*Limnanthes vincularis*) occurs in seasonally wet meadows, swales and vernal pools in the Santa Rosa Plain, Sonoma County, and one occurrence in Napa Co. According to the [California Natural Diversity Database](#) and the Laguna de Santa Rosa Foundation [Vernal Pool Survey](#) database, there are 37 extant occurrences on the Santa Rosa Plain. Any activities that cause the destruction of the plants or hydrologic changes in their habitats represent the primary threats to the species, such as urbanization, industrial development, agricultural land conversion, off-highway vehicle use, horseback riding, trampling by grazing cattle and road widening (USFWS 1991).

Burke's Goldfields (*Lasthenia burkei*). This vernal pool species is known only from southern portions of Lake and Mendocino counties and from northeastern Sonoma County. Historically, 39 populations were known from the Santa Rosa Plain, two sites in Lake County, and one site in Mendocino County. The occurrence in Mendocino County is most likely extirpated, and there are 20 extant occurrences within the Santa Rosa Plain. Any activities that cause the destruction of the plants or hydrologic changes in their vernal pool habitats represent the primary threats to the species, such as urbanization, industrial development, agricultural land conversion, off-highway vehicle use, horseback riding, trampling by grazing

cattle and road widening. Vernal pool habitat is highly susceptible to damage or destruction due to the dependency of the pool upon an intact impermeable subsurface soil layer or *durapan* (USFWS 1991).

Many-flowered Navarretia (*Navarretia leucocephala* ssp. *plieantha*). This endangered species occurs in eight locations in Lake and Sonoma counties, one within the Santa Rosa Plain. Major threats to this species' recovery are habitat loss or degradation due to urbanization, vernal pool, wet meadows, forest openings wetland drainage, vernal pool and pond construction, industrial development, agricultural land conversion, ditch construction, off highway vehicles, road widening, horseback riding, trampling by cattle (Center for Plant Conservation).

Listed endangered, threatened or special concern animals native to the Laguna de Santa Rosa Wetland Complex include:

California Tiger Salamander (*Ambystoma californiense*; CTS) is listed as Vulnerable in the IUCN Redlist (Hammerson 2004), federally threatened, and as a California species of Concern (CSC). California tiger salamanders found in the Santa Rosa Plain in Sonoma County are geographically separated from other California tiger salamander populations. (Federal Register CTS).

Coho Salmon (*Oncorhynchus kisutch*) which is listed as federally endangered and State threatened occur in Mark West and Santa Rosa creeks;

Steelhead Trout (*Oncorhynchus mykiss*) which is federally threatened, occur in Mark West, Santa Rosa and Copeland creeks.

California freshwater shrimp (*Syncaris pacifica*); federally endangered, occur in the Blucher creek tributary to the Laguna de Santa Rosa.

Western Pond Turtle (*Clemmys marmorata*) is listed as 'Vulnerable' in the IUCN Redlist (Tortoise & Freshwater Turtle Specialist Group 1996) and as a California species of Concern (CSC). There are remnant populations extant in the wetland complex, yet recruitment of young turtles is problematic (Nick Geist, pers. com.)

The site also hosts a breeding pair of American Bald Eagle (*Haliaeetus leucocephalus*), a species of special concern.

Criterion 3: Supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

The Laguna de Santa Rosa Wetland Complex is habitat to several animals, plants, or plant communities endemic to and considered representative of their threatened vernal pool habitat. The Santa Rosa Plain vernal pool complex has an ecologically distinctive flora and fauna that has evolved over the millennia to adapt to the extreme wet and dry conditions of this unique ecosystem. The irreplaceable community includes four plant (Sonoma sunshine (*Blennosperma bakeri*), Sebastopol meadowfoam (*Limnanthes vincularis*), Burke's Goldfields (*Lasthenia burkei*), and Many-flowered Navarretia (*Navarretia leucocephala* ssp. *plieantha*)), and one animal species (California Tiger Salamander (*Ambystoma californiense*)) that are listed on both the U.S. Federal and the State of California's endangered species list. The loss of these species and their native communities would represent a significant loss to local biodiversity as well as to that of the Mediterranean and Northern California Coast biogeographic regions. Currently there are over 100 plant and animals species under threatened, endangered or special concern status extant in the Laguna de Santa Rosa watershed (Honton & Sears 2006), most of which are found in the LSRP wetland complex.

Criterion 9: Supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

As California's vernal pools, grasslands, and oak woodlands disappear, the California tiger salamander's plight is particularly extreme in Sonoma County, where development threatens 95 percent of remaining salamander habitat. The entire endangered Sonoma county tiger salamander population is endemic to the Santa Rosa Plain, and is geographically separated from other California tiger salamander populations (Federal Register 2003). At least 1% of its remaining population is found within the California Department of Fish and Game and Sonoma County Agricultural Preservation and Open Space District Preserve Properties within the Laguna de Santa Rosa Wetland Complex.

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Mediterranean California ¹

Mediterranean Division ²

Northern California Coast, Subsection; Coastal Hills - Santa Rosa Plain ³

b) biogeographic regionalisation scheme (include reference citation):

¹ Commission for Environmental Cooperation. 1997. *Ecological Regions of North America*. CEC, Montreal.

² Robert G. Bailey. 1995. *Description of the Ecoregions of the United States*, United States Department of Agriculture, Forest Service.

³ *Ecological Subregions of California*, USDA, Forest Service; USDA, Natural Resources Conservation Service, and USDI, Bureau of Land Management

16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The Laguna de Santa Rosa Wetland Complex is situated within the Laguna de Santa Rosa watershed that has a complex and variable hydrology. Set in a Mediterranean climate with annual wet-and-dry seasons with an average precipitation of 68-91 cm (27-36 inches), the watershed includes numerous tributary streams, the majority of which drain west from the Sonoma Mountains across the Santa Rosa Plain towards the northwest trending Laguna de Santa Rosa wetland ecosystem (Honton & Sears 2006). Principal tributary streams rise on the southern slopes of the Sonoma and Mayacamas Mountains, such as Mark West Creek, Santa Rosa Creek, Copeland Creek, Hinebaugh Creek, Five Creek, Washoe Creek and Blucher Creek. On the west side, Blucher Creek and Gossage Creek join the Laguna at the southern end of the Santa Rosa Plain.

The uplands are drained in the winter wet season by high-gradient, high-energy, coarse-bedded mountain channels, which flow down the hillsides to the broad, flat, vernal pool-dotted Santa Rosa Plain. In the summer, some tributary creeks' overland flow may cease in areas, consist of a winding ribbon of flow, or flow may become stagnant and pond. The main stem Laguna de

Santa Rosa is a slow-moving channel that includes creek-like reaches as well as a series of lakes and a large floodplain with a capacity of storing over 80,000 acre feet (99,000,000 m³) of storm water. There are numerous vernal pools, underlain by an impervious hardpan layer, on the floodplain and the abutting Santa Rosa Plain oak savannah vernal pool grasslands, extending for miles to the east.

The Laguna de Santa Rosa is listed as impaired on the federal Clean Water Act Section 303(d) List for sediment, temperature, dissolved oxygen, nitrogen, phosphorus, and mercury. (http://www.lagunafoundation.org/programs_sr_wr.shtml). A process to provide maximum thresholds for these impairments is under way to implement improvement programs in 2011.

Geology and Soils

The Santa Rosa Plain is surrounded by two actively uplifting ranges, the Santa Rosa block due east (underlying the Mayacamas and the Sonoma Mountains), and the Sebastopol block due west (underlying the Gold Ridge). The western edge of the Laguna floodplain, near Sebastopol, is the boundary between these two blocks. Erosion acted on the exposed surfaces after these mountains tilted and uplifted, washing sediment into the syncline occupied by the Laguna in the form of an alluvial fan. The main tributaries have eroded 'V' shaped incised valleys into the ranges. Rapid erosion is a characteristic of the uplifting of ranges. Therefore, naturally high levels of sediment are transported from the hills on both the east and west sides of the Laguna watershed. (Sloop et al. 2007). Urbanization in the surrounding area has led to increased runoff entering the Laguna watershed.

Soils within the Laguna de Santa Rosa Wetland Complex are dominated by alfisols and vertisols. Nearer to the Laguna de Santa Rosa main channel, soils are typified by the Clear Lake Clay series, a partially hydric, poorly drained soil of 0-2% slope. Farther from the Laguna de Santa Rosa main channel, soils are typified by the Wright series, a partially hydric, somewhat poorly drained soil of 0-2% slope. Both are underlain by a dense subsurface clay layer that leads to surface ponding and the formation of vernal pools.

Vernal Pools

In vernal pool landscapes below the upper layers of soil there is a strongly cemented hardpan layer with a shallow depth of 2 to 3.5 feet to the hardpan. Water cannot penetrate the hardpan, and therefore, it cannot reach the lower more permeable layers of geologic materials. Surface depressions fill with water during the rainy season, and become vernal pools and swales. The Huichica-Wright-Zamora association is considered to be prime soil for the wetland habitat of the California tiger salamander. About two million years ago, in the area of the present-day Santa Rosa Plain, water ponded on ancient alluvial deposits and dissolved the area's rocks resulting in the precipitation of minerals; these precipitated minerals formed into continuous concrete-like layers, which today results in the vernal pool topography of the area. (Honton & Sears 2006).

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type). The Laguna de Santa Rosa Wetland Complex is located in the Cotati Valley, an intermontane valley of the Coast Range. The movements of tectonic plates are responsible for the long valleys and ridges of the Coast Range that run parallel to the California Coast (Honton & Sears, 2006). The Coast Range was formed when the Farallon Plate was subducted under the North American Plate. The North American Plate continued moving west until it collided with the Pacific Plate. The San Andreas Fault system is the transform plate boundary between the persistently moving North American and Pacific Plates. About five million years ago, the movements of these great

tectonic plates activated the Sonoma Volcanics which spread lava and ash over the Mayacama Range and Sonoma Mountain to the east of the Santa Rosa Plain. Once a shallow sea, the Santa Rosa Plain was partially covered with the sedimentary deposits washed down from the mountains (Ford 1975).

The highly diversified soils of the watershed are a direct result of these geological activities. In turn, this diversified substrate has given rise to a complex pattern of soils that have in turn supported a wide range of plant communities, supported by a climate characterized by an average annual rainfall ranging from 68 cm (27 inches) in the southern plain to 157 cm (60 inches) in the upper mountains. The watershed's diverse geology and wide climate range have together contributed toward the creation of an environment that supports many different types of plants and an abundance of wildlife. (Sloop et al. 2007).

The character of Laguna watershed channels reflects underlying geological structures. The Santa Rosa Plain is surrounded by two actively uplifting ranges: the Mayacamas and the Sonoma Mountains in the east and Gold Ridge in the west. The boundary between the uplifting ranges is the western edge of the Laguna floodplain, near Sebastopol. As these mountains have tilted and uplifted, erosion has acted on the exposed surfaces, washing sediment into the syncline occupied by the Laguna in the form of an alluvial fan. The main tributaries have eroded 'V' shaped incised valleys into the ranges. Rapid erosion is a characteristic of the uplifting of ranges. Therefore, naturally high levels of sediment are transported from the hills on both the east and west sides of the Laguna watershed. (Sloop et al. 2007). Urbanization in the surrounding area has led to increased runoff entering the Laguna watershed.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The Laguna de Santa Rosa stores water and prevents flooding downstream. Without the Laguna the town of Guerneville would be flooded by 14 more feet of water during a winter flood event. (<http://www.ci.santa-rosa.ca.us/videos/Pages/laguna.aspx>). The ability of the lower Laguna de Santa Rosa-Mark West system to provide flood storage both of its own waters and those incoming from the Russian River is recognized. The Laguna basin is expected to provide 79,000 acre-feet of water storage at the 100-year (75 feet NGVD29) flood level. (Sloop et al 2007).

The lower floodplain of the Laguna de Santa Rosa is one of the main areas where sedimentation occurs as particles moved in high energy flow events settles out. This dynamic has become a liability as the non-native aquatic Water Primrose (*Ludwigia hexapetala*) became established in recent, invading most of the lower floodplain (with water depths at or below 2 feet), and negatively affecting water quality by decreasing dissolved oxygen.

Groundwater recharge throughout the Santa Rosa Plain is currently being investigated by the Sonoma County Water Agency with the goal of preparing and implementing a groundwater management plan within the basin (Marcus Trotta, pers. com.). The specific value of Laguna and Santa Rosa Plain wetlands in groundwater recharge will be established in this process.

19. Wetland Types

a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

Laguna Site:

M -- Permanent rivers/streams/creeks; area (over 50 km)

N -- Seasonal/intermittent/irregular rivers/streams/creeks.

O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

TP -- Permanent freshwater marshes/pools; ponds (below 8 ha)

Ts - Seasonal freshwater marshes/pools; ponds (below 8 ha)

W -- Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.

2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).

3 -- Irrigated land; includes irrigation channels and rice fields.

4 -- Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture).

6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha).

7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools.

8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.

9 -- Canals and drainage channels, ditches.

Vernal Pool sites:

Ts - Seasonal freshwater marshes/pools; (below 8 ha)

4 - Seasonally flooded grazing land; (approximately 50 ha)

N - Intermittent creeks; (below 10 km)

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

The Laguna de Santa Rosa Wetland Complex's wetland areas consist of a number of different ecological communities including creeks, ponds, deeper lake-like areas, freshwater marshes, and seasonal vernal pools, swales, and wet meadows. It is a dynamic landscape, with seasonal and spatial variation. The Complex's upland areas are characterized by riparian forest, perennial and annual grasslands, oak savannah grasslands, and oak woodlands. These in some cases rare habitats support a unique community of plants and animals, some of which are endemic only to the Santa Rosa Plain of Sonoma County.

The LSRWC serves as critical habitat for waterfowl and is part of the Pacific Migratory Flyway. It further serves as important floodplain and helps thousands of Sonoma County residents each year avoid property damage or loss due to flooding. The LSRWC is an important remnant of California's wetlands, and it is therefore critical to protect, enhance, and expand it to counteract the worldwide decline of wetland systems within the Mediterranean bioregion.

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

The vernal pool communities of California are unique combinations of a related group of genera spanning the entire state. Recently, Dr. Michael Barbour and his colleagues have established a community classification of California vernal pool ecosystems. While the Santa Rosa Plain vernal pools have not yet been extensively sampled, the region has been established to including unique community associations (Ayzik Solomesch, pers. com.). Some specific species that are rare and unique to the Santa Rosa Vernal Pool complex are the four listed taxa discussed above ([Sonoma sunshine](#) (*Blennosperma bakeri*), [Sebastopol meadowfoam](#) (*Limnanthes vinculans*), [Burke's Goldfields](#) (*Lasthenia burkei*), and [Many-flowered Navarretia](#) (*Navarretia leucocephala* ssp. *plieantha*)), as well as Lobb's aquatic buttercup (*Ranunculus lobbii*), a plant with limited distribution that floats on vernal pools, Dwarf downingia (*Downingia pusilla*), and Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*). Within oak Savannah vernal pool grasslands unique species include North Coast semaphore (*Pleuropogon hooverianus*) a rare grassland plant, Hayfield tarplant (*Hemizonia congesta* ssp. *leucocephala*), Thin-lobed horkelia (*Horkelia tenuiloba*), Marsh microseris (*Microseris paludosa*), Little mousetail (*Myosurus minimus*), and Gairdner's yampah (*Perideridia gairdneri* ssp. *Gairdneri*).

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Besides the animal species of special concern discussed above a suite of special concern bird species found in Laguna and Santa Rosa wetland complex is worthy of mention (Honton & Sears 2006).

American white pelican (*Pelecanus erythrorhynchos*) are fish feeders and need large open water bodies for feeding habitat. The area's large population of introduced Louisiana crayfish (*Procambarus clarkii*) is also thought to be an important part of their local diet. The Laguna de Santa Rosa is at the far northern edge of the pelican's winter range.

Redheads (*Aythya americana*) inhabit seasonally flooded wetlands with persistent emergent vegetation. They forage on the rhizomes and tubers of aquatic vegetation, as well as on aquatic invertebrates including crustaceans, mollusks and insects. Cattails and tules are a likely habitat for Redheads, with mature tule seeds providing food. The intentional removal of cattails and tules for mosquito and flood control may be a limiting factor in their local abundance.

Tricolored blackbirds (*Agelaius tricolor*) nest in cattails, tules, and a variety of other species found in flooded areas that are defensible against mammalian predators. Tricolors will not roost/nest without access to open water, and will avoid narrow strips of emergent vegetation along channels. Tricolors favor agriculturally productive habitats such as irrigated pasture, maturing grain crops and dairies. Foraging tricolors are particularly attracted to ephemeral pools. As an endemic North American bird species with a narrow habitat range, Tricolored Blackbirds are at a far greater risk than other widely distributed endangered species such as Swainson's Hawks and Burrowing Owls, but because they are a flocking species, and are in some places abundant, they often fail to command much conservation attention. In the Laguna the encroachment of hayfields in the floodplain and the loss of cattail and tule stands are likely limiting factors and represent future restoration opportunities.

Olive-sided flycatchers (*Contopus cooperi*) are nearctic-neotropical migrants, with the Laguna at the southern edge of their summertime range: they typically arrive in May. Their preferred habitat consists of montane and coniferous forests, often associated with forest openings and edges, especially those with snags or live trees that provide foraging and singing perches. They are frequently found along streams, lakes and wetlands where natural edge habitat and standing dead trees occur. Their prey is almost exclusively flying insects, including bees, wasps, beetles, flies, moths and dragonflies. The most likely habitats for Olive-sided flycatchers in the Laguna watershed are the eastern edge of the Goldridge hills adjacent to the standing water of the Laguna. Lack of natural fire-created openings in the forest has been cited in other areas as being a limiting factor, but the lack of regular insect foraging habitat may be more limiting in the Laguna, especially in otherwise suitable habitats that are adjacent to orchards and vineyards which employ insecticides.

Northern Harrier (*Circus cyaneus*) are found year round near fresh water marshes, wet grasslands, and hayfields within the sites. Their distribution is tied to small diurnal grassland rodents.

American Peregrine Falcon (*Falco peregrinus anatum*), which was listed federally as endangered until delisting in 1999, is still listed as endangered under the California Endangered Species Act.

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

Historical:

The Southern Pomo were the first inhabitants of the Laguna and today many still live within their ancestral territory. Archaeological data in Southern Sonoma County indicates the land surrounding the Laguna de Santa Rosa was under the control of three Pomo tribelets which together, controlled about 350 square miles. As nomadic seasonal gatherers, they lived on roots, nuts, berries, fish, coastal shellfish, waterfowl, and game. Anthropological sources clearly show that, in recent times, the Indians of the area constructed tule-canoes and tule-huts; and weaved fine, water-tight baskets from native sedge roots. The Southern Pomo are well known for their baskets.

Supporting the claim that these three Pomo tribelets were the occupants of the territory is the fact that there are over 80 archaeological sites that have been identified within the Laguna's historic marshlands as being Pomo. Some of the sites are on the floodplains on the western margin of the Laguna.

The rich Laguna wetlands were an important resource for the Pomo people, and the ancient Laguna of 2000 BC supported these tribes with abundant fish, fowl and tule reeds for manufacturing homes and canoes. Control of these resources created a reported tension between the three Pomo tribelets themselves, and territorial borders appear to have been strictly enforced. Permission was needed to pass through each tribelet's territory.

Now established as the Federated Indians of Graton Rancheria, the current tribe consists of both Coast Miwok and Southern Pomo people. Their tribal ancestors existed for thousands of years before us with territorial lands which include all of Marin and southern Sonoma counties.

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) **sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:**

Native tribes that inhabited the Laguna and Santa Rosa Plain region were known to implement frequent grassland burns to tend to resultant large Valley Oak (*Quercus lobata*) trees (providing one of their staples – acorns) which kept the open character of the oak savannah grasslands throughout the Santa Rosa Plain. Anthropological sources show that the native tribes of the area constructed tule-canoes and tule-huts; and weaved fine, water-tight baskets from native sedge roots. To do so, they collected materials to make baskets from the roots of the basket sedge (*Carex barbara*) that grows in the Laguna. (<http://www.ci.santa-rosa.ca.us/videos/Pages/laguna.aspx>).

- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

Archaeological data in Southern Sonoma County indicates the land surrounding the Laguna de Santa Rosa was under the control of three Pomo tribelets which together, controlled about 350 square miles. Anthropological sources clearly show that, in recent times, the Indians of the area constructed tule-canoes and tule-huts; and weaved fine, water-tight baskets from native sedge roots. The Southern Pomo are well known for their baskets. Supporting the claim that these three Pomo tribelets were the occupants of the territory is the fact that there are over 80 archaeological sites that have been identified within the Laguna's historic marshlands as being Pomo. Some of the sites are on the floodplains on the western margin of the Laguna.

24. Land tenure/ownership:

a) within the Ramsar site:

City of Santa Rosa Farms (public)

City of Sebastopol Preserve (public)

California State Department of Fish and Game Laguna Wildlife Area and Vernal Pool Preserve sites (public)

Sonoma County Agricultural Preservation and Open Space District Preserves (public)

Sonoma County Water Agency creek channels and riparian zones (public)

Laguna de Santa Rosa Foundation Preserve (private)

Private landowners (Ranchettes (usually with horses or sheep), privately owned mitigation banks) (private)

b) in the surrounding area:

Dairies, ranches, vineyards, orchards, specialty farms, and other, mainly private parcels.

25. Current land (including water) use:

a) within the Ramsar site:

Current land use of the entire Laguna de Santa Rosa watershed consists of urban and rural areas that include approximately 2.2 thousand hectares of vineyards, 1.6 thousand hectares of pasture, 1.1 thousand hectares of dairies, and 0.5 thousand hectares of mixed agriculture. Land-use within the 100-year floodplain, where the largest portion of the LSR wetland complex is found, includes hay production, dairies, pastures, vineyards, horses, cattle, poultry, and a wastewater treatment facility.

The main land use within much of the wetland area is wildlife habitat preserves. There is no distinct recreational use of the aquatic areas to date, but plans by the Sonoma County Agricultural and Open Space District are in progress for a Laguna de Santa Rosa trail system that will traverse some of the LSR wetland complex site. Trail construction is slated for 2010.

b) in the surroundings/catchment:

Floodplain, agricultural uses during dry season, private ranchettes, houses and yards, same as in 25a) above.

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

a) within the Ramsar site:

In the past century, woodlands were cleared and wetlands were drained for cattle ranching and farming. In the early decades of the 20th century, the cities of Santa Rosa and Sebastopol constructed pipes to discharge wastewater into creeks that led directly to the Laguna. This increase in water pollution led to a decrease in biodiversity. Then starting in the 1940s, agricultural land was converted to urban area as population increased exponentially. With the advent of inexpensive tractors and fertilizer, smaller farms were consolidated as industrialized agriculture became the new method of farming. The over use of fertilizer polluted the Laguna and Santa Rosa Plain's wetlands with excessive quantities of nutrients. To make the Santa Rosa Plain more habitable many vernal pools were drained, and to avoid flooding, the natural drainage system was altered by the creation of drainage and flood control channels. This prevented and continues to prevent sediments from depositing on the upper Santa Rosa Plain while increasing the sediment deposition in the Laguna. The sediment deposition has reduced the water depth in some areas of the Laguna. Shallow areas caused by this sedimentation are vulnerable to colonization of the invasive non-native Water Primrose (*Ludwigia hexapetala*). More and more Santa Rosa Plain grasslands and agricultural lands have been converted to vineyards and suburban areas in recent decades.

With regard to water quality, the Laguna de Santa Rosa is listed as impaired under the federal Clean Water Act, section 303(d), for sediment, nitrogen, phosphorus, temperature, mercury, and dissolved oxygen. A variety of non-native Invasive species are found (e.g. Water Primrose, Perennial pepperweed, bullfrogs, Louisiana crayfish) that have changed the character of the native ecosystems over the last century.

b) in the surrounding area:

Same as in 26a), plus the pressures from close-by urban areas (e.g. traffic, noise)

27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

A subset of parcels within the LSR wetland complex are under conservation easements, or are designated at State owned wildlife areas, conservation or mitigation banks. Most parcels within the Ramsar site are bounded by private landowner parcels.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

A Restoration and Management Plan titled 'Enhancing and Caring for the Laguna' was published in 2006 (Honton & Sears). The Laguna de Santa Rosa Foundation has since then used this plan to develop a five-year Research and Restoration Plan that will help implement the identified conservation goals in the watershed

<http://www.lagunafoundation.org/knowledgebase/?q=node/198>).

d) Describe any other current management practices:

Some of the vernal pool preserves owned by the Department of Fish & Game are under prescribed grazing management, yet grazing regimes have not been implemented at all their preserve properties within the site. A subset of City of Santa Rosa owned parcels are farmed for hay production using reclaimed water. The Laguna Foundation is currently implementing riparian restoration plantings along the middle reach of the Laguna de Santa Rosa. Most private ranchettes graze livestock, mainly horses or sheep.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

Enhance Native Aquatic Habitats to Maximize System Function/Biodiversity

- Reduce and regulate toxic inputs to Total Maximum Daily Load (TMDL) levels (once determined in 2011)
- Manage/control existing invasive species (*partly implemented*)
- Early detection of new invasive species and rapid response for early eradication
- Initiate long-term surveys evaluating wetland system biotic components (*partly implemented*)
- Reduce and prevent non-native/invasive species introductions
- Restore ~300 miles of degraded riparian zones in the watershed by 2020 (*partly implemented*)
- Reduce nutrients and other pollutants to below set standards: TMDL

Improve Water Quality

- Education and policy – initiate collaborative approach between regulators & practitioners (*partly implemented*)
- Establish network of monitoring stations for planning and enforcement of TMDL's
- Continue research and planning support for TMDL's and storm water management etc.

Enhance Native Terrestrial Habitats to Maximize System Function/Biodiversity

- Restore native grassland on Laguna Upland Preserve
- Restore all available degraded or absent riparian zones in the watershed (*partly implemented*)
- Establish habitat corridors and connect them to existing corridors
- Reduce and prevent non-native/invasive species introductions by establishing an early detection/rapid response program in partnership with the Bay Area Early Detection Network (BAEDN)
- Restore uplands around biologically sensitive areas such as vernal pools

Preserve and Manage Natural Vernal Pool Ecosystems on SR Plain

- Preserve all extant natural populations of vernal pool endangered endemics (plants, CTS)
- Establish small high value vernal pool preserves in system of larger preserves
- Establish center for SR plain vernal pool conservation science at Laguna Learning Center
- Characterize and preserve the full range of diversity of the SRP vernal pool ecosystem (*partly implemented*)
- Establishment of an effective adaptive vernal pool management process to guard against the extinction of the listed plants (*partly implemented*)

Maintain Laguna as Bird Migratory Route & Nesting Site of Neotropical Migrants

- Designate Laguna de Santa Rosa Wetland Complex as important bird area
- Evaluate importance of Laguna as Pacific flyway stopover-range of species & show time of arrival and departure - link to climate change PRBO collaboration
- Gather data from Bird rescue and waterfowl association
- Collaborate with Ducks Unlimited - egg and nest rescue etc
- Collaborate with PRBO Conservation Science to implement bird mist-netting
- Establish historical context of bird diversity & abundance
- Examine impacts from invasive exotics on native birds (e.g. turkey use of acorns, cowbird and starling use of nesting cavities etc.)

Maintain and Restore Functional Habitat Corridors

- Increase corridor width & structural complexity
- Removal of barriers
- Restore 50% of streams with riparian corridors
- Establish California Tiger salamander corridor to breeding sites
- Remove all fish passage barriers
- Connect/maintain/preserve Laguna watershed to Sonoma Valley corridor and other existing corridors

Achieve a Balanced Sediment Budget: Erosion & Sedimentation

- Reduce excessive erosion in problem areas
- Reduce historically accumulated sediment in appropriate areas

Preserve Groundwater Recharge Areas

- Establish well monitoring program in watershed
- Evaluate locations of groundwater recharge areas - US geologic survey is doing this right now
- Preserve extent of Laguna recharge areas & reestablish areas where recharge occurred historically

Prevent Encroachment of Laguna's Floodplain

- Floodplain acquisition plan for land along flood control areas
- Compatible use in the floodplain analysis' to accompany acquisition plan
- Put together comprehensive presentation to supervisors and farm bureau to educate them about the importance of floodplain management

Evaluate and Promote Laguna Ecosystem Services

- Engage natural resources economist and put price tag on Laguna ecosystem services
- Promote findings and start outreach campaign to policy and decision makers and public

The Laguna and Global Climate Change

- Promote climate change movement and put into Laguna context
- Establish sensible plans for watershed management restoration conservation for long-term in light of potential changes in flooding regime, species distributions, temperature, rainfall patterns etc...

29. Current scientific research and facilities:

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

As part of the Laguna Learning Center the Laguna de Santa Rosa Foundation is planning to establish a Science Education Interpretive Center and Field Research Station. The capital campaign is currently under way and the start of construction is slated for 2010.

In 2008 the Laguna de Santa Rosa Foundation launched the Laguna Watershed Knowledgebase, an online digital library to easily make accessible information and data on the watershed.

<http://www.lagunafoundation.org/knowledgebase/>

Biodiversity Monitoring:

Laguna Bird Point Count Surveys – These surveys were conducted by the Laguna de Santa Rosa Foundation and PRBO Conservation Science at 44 point count location within the LSRPWC site in years 2004, 2005-2009 to establish a biotic indicator baseline for measurements of potential impacts from the implementation of a Laguna trail system.

Laguna Bird Area Search Surveys – These monthly surveys conducted by trained citizen science volunteers managed by the Laguna de Santa Rosa Foundation compare the bird fauna between a reference riparian forest site and a riparian restoration site where plantings have been implemented by the Laguna de Santa Rosa Foundation since 2007.

Heron Rookery Surveys - A rookery of great-blue herons and double-crested cormorants is monitored and the data are used by Audubon Canyon Ranch as part of the long-term study of heron/egret populations in counties of the North Bay area.

<http://ci.santarosa.ca.us/departments/utilities/treatment/natresource/Pages/alpha.aspx>

Endangered Vernal Pool Plant Surveys – These annual surveys of three endangered species of vernal pool plants (Sonoma sunshine, Sebastopol meadowfoam, and Burke's goldfiedls) are conducted by Laguna de Santa Rosa Foundation trained citizen science volunteers using vetted standardized protocols to establish a long-term record of the range-wide status to inform management and promote recovery (<http://www.citizen-science.org>).

Salmonid Surveys - As part of a Fisheries Enhancement Program, the Sonoma County Water Agency (SCWA) conducts wildlife and habitat studies aimed at endangered Salmonid species within the Russian River watershed. The fish and habitat monitoring program contains several Russian River tributaries, including Mark West Creek, Santa Rosa Creek and Millington Creek

within the Laguna de Santa Rosa watershed. The aim of the Salmonid monitoring program was to detect trends in Salmonid populations and identify possible fisheries management and enhancement opportunities. The program began in fall 1999 with a pilot study to collect detailed distribution, habitat use and juvenile abundance data in streams of the Russian River basin, sampling five of its tributaries via electro-fishing and snorkel surveys for three years (see Sloop et al. 2007, Ch 6).

Stream Inventories - Reports from California Department of Fish and Game (CDFG) are available for several tributaries of the Laguna de Santa Rosa: Santa Rosa Creek, North Fork Santa Rosa creek, Blucher creek, and Copeland creek. The latest inventories were conducted during the summer of 1998 for Santa Rosa Creek and North Fork Santa Rosa Creek, and in July & August of 2001 for Copeland and Blucher creeks. All inventories followed the methodology presented in the California Salmonid Stream Habitat Restoration Manual, sampling approximately 10% of habitat units within the survey reach. Due to inadequate staffing levels, no biological surveys were conducted for Copeland, Blucher and North Fork Santa Rosa creeks as part of these most recent inventories (see Sloop et al. 2007, Ch 6).

Benthic Macroinvertebrate Surveys - The City of Santa Rosa stormwater monitoring program includes a professional benthic community survey for six creeks within the Santa Rosa urban boundary. Benthic macroinvertebrate (BMI) sampling has been conducted at set monitoring sites along Brush, Colgan, Matanzas, Paulin, Piner, and Peterson creeks by City of Santa Rosa staff from 1998-2005. BMI samples are sent to a certified laboratory (SLSI in Chico, CA) each year and processed and evaluated according to the appropriate regional Index of Biotic Integrity (norCal IBI) (see Sloop et al. 2007, Ch 6).

Creek Bioassays - The City of Santa Rosa conducts bioassay tests to determine whether storm water runoff is impacting the water quality in creeks that support fish populations (City of Santa Rosa 2005). Toxicity is measured by exposing twenty rainbow trout fry (15-30 days of age) under controlled conditions to 100% sample water for 96 hours, noting percent survival. Bioassay samples were collected from eight sampling sites within the Santa Rosa urban boundary during the 2004-2005 rainy season. Environmental field data accompanied results from each sampling location, indicating conditions that meet basin plan objectives for pH, and odors for all sites. Elevated turbidity levels were observed in Santa Rosa and Peterson creeks. The representative storm at Santa Rosa creek exceeded basin plan objectives for temperature with a difference of 5.4 degrees F (see Sloop et al. 2007, Ch 6).

Laguna de Santa Rosa Foundation Research Projects

Endangered plant genetics - Assessment of the conservation genetics of three species of endangered vernal pool plants on the Santa Rosa Plain (Sonoma sunshine (*Blennosperma bakeri*), Sebastopol meadowfoam (*Limnanthes vinculans*), and Burke's goldfields (*Lasthenia burkei*)) in order to determine their range wide population status and future adaptive potential.

Reproductive Ecology of Endangered Plants - Investigation into the annual seed set, seed bank size, and pollination ecology of three species of endangered vernal pool plants on the Santa Rosa Plain (Sonoma sunshine (*Blennosperma bakeri*), Sebastopol meadowfoam (*Limnanthes vinculans*), and Burke's goldfields (*Lasthenia burkei*)) in order to better understand the factors in successful reproduction of these declining species to ensure their recovery.

Wetland Management Trials – Implementation of treatment trials to assess the effect of mowing versus mowing & harrowing on floodplain vernal wetland native biodiversity and the successful conservation of an extant population of Sebastopol meadowfoam (*Limnanthes vinculans*) on site.

Efficacy of Tarping to Control Perennial Pepperweed - Implementation of treatment trials over five years to determine whether tarping is an effective control method for small patches of Perennial pepperweed (*Lepidium latifolium*).

Laguna Aquatic Community Survey – August 2006: pilot effort to assess the food web dynamics within the slow-moving deep lake-like areas of the Laguna de Santa Rosa in conjunction with water quality and habitat parameters.

Watershed Processes Conceptual Model - Development of a pre-TMDL (Total Maximum Daily Load) Conceptual Model of Laguna watershed processes to evaluate the physical, chemical, and biotic factors that affect beneficial uses of the Laguna's watershed regarding water quality (Sloop et al 2007).

Sonoma State University Graduate Research

Sonoma State University graduate student research within the LSRP wetland complex includes:

- Assessment of the benefits of grazing to native vernal pool flora.
- Investigation into the factors determining Valley Oak (*Quercus lobata*) regeneration within grazed and ungrazed Santa Rosa plain oak savannah grasslands.
- Studies on Western Pond turtle (*Clemmys marmorata*) abundance, demography, reproduction, and diet requirements.

Invasive Water Primrose-willow Research

Exotic Uruguayan primrose-willow (*Ludwigia hexapetala*) has aggressively spread in recent years and has impacted sensitive wetlands of the Laguna de Santa Rosa and greater Russian River watershed.

Dr. Brenda Grewell, a research ecologist with the USDA-Agricultural Research Service has initiated ecological, cytological and genetic studies in 2005 to confirm species identity in California and to assess factors influencing invasion success and so address a number of key uncertainties with regard to the *Ludwigia* sp. invasion. The overall goal of her research program is to understand the mechanisms that control the dynamics of aquatic and riparian plant communities and promote the invasion of exotic species, and to identify key factors that must be overcome for successful integrated weed management and wetland restoration. The development of effective management strategies for invasive *Ludwigia* sp. Control requires information regarding weed tolerance and response to a range of environmental conditions (see Sloop et al. 2007, Ch 6).

The USGS study of flow and sedimentation processes

The study includes development of a conceptual model of floodplain processes and sedimentation, a sediment budget, measurement of floodplain sedimentation and inundation, and extrapolation of the results throughout the basin in GIS in order to evaluate the changes in flood storage capacity over time (Sloop et al 2007).

USACE Santa Rosa Creek basin hydrology assessment

The Army Corps of Engineers conducted a hydrologic modeling study of the Santa Rosa Creek watershed and published a draft report. The study was conducted using the Hydrologic Modeling System, HMS, to simulate precipitation versus runoff process in the Santa Rosa Creek watershed (Sloop et al 2007).

USACE Laguna de Santa Rosa basin hydrology assessment

The Army Corps of Engineers San Francisco District (USACE) conducted a basin hydrology assessment of the Laguna de Santa Rosa watershed in 2003. This study has not yet been published (Sloop et al 2007).

2004 Laguna Sedimentation Study

Philip Williams & Associates (PWA) estimated the rate and effect of sedimentation processes in the Laguna watershed and articulated on the implications of these processes on flood conveyance through the Laguna and in flood channels (Sloop et al 2007).

Study of the 2006 New Year's Flood

The USGS studied the 2006 New Year's flood in the Laguna floodplain. The objectives of the study were to measure and map the inundation extent of the New Year's flood of 2006 on the Laguna de Santa Rosa and analyze the precipitation intensities causing these high peak flows. This study also investigated the conditions under which the floodplain deposition occurred during and after the flood, and developed a deposition potential map of the area for this precipitation event to provide an upper boundary for floodplain sedimentation conditions (Sloop et al 2007).

Laguna Flow and Sediment Modeling

NASA/AMES researchers modeled river flows and sediment dynamics for the Laguna de Santa Rosa watershed using the USDA Soil & Water Assessment Tool (SWAT) model. The model was applied to understand management options that may improve water quality in the watershed (Potter & Hyatt in press).

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Laguna Stakeholder Council - convened semi-annually by the Laguna de Santa Rosa Foundation is a forum for addressing watershed issues. This is where the designation of the Laguna de Santa Rosa Wetland Complex as a Ramsar site was introduced to stakeholders in both 2008 meetings.

Laguna de Santa Rosa Foundation Education Programs - include docent-led walks, the Laguna Learning Adventure class series, community walks, and *Learning Laguna*. The *Learning Laguna* school program offers schoolchildren in the 2nd - 5th grades the opportunity to learn more about wetlands and watershed science by in-classroom sessions and several field trips.

The Laguna de Santa Rosa Foundation also regularly engages local volunteers to help in restoration as 'LagunaKeepers,' and in research as bird survey or 'Adopt-a-Vernal Pool' volunteers where they adopt a vernal pool site and using a standardized protocol help to gather survey data as citizen scientists.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Only small portions of the LSR wetland complex are currently open to the public. There is the Joe Rodota pedestrian and bike trail that currently crosses through some portions, and additional Laguna trails under development by the Sonoma County Agricultural Preservation and Open Space District to be built in 2010. The Laguna Wetlands Preserve along the Laguna in Sebastopol has been designated as an official Watchable Wildlife Site in 2008 (<http://www.cawatchablewildlife.org/viewsite.php?site=327&display=q>).

The Laguna de Santa Rosa Foundation has been conducting a capital campaign since 2008 to build Educational and Research Facilities: the Laguna Learning Center, composed of a Science Education Interpretive Center and Field Research Station. This Center is located within the LSRP wetland complex area and will serve as one of the trail heads for the planned Laguna trail system.

In some areas of the Laguna kayaking is a favorite recreational activity, and a number of fishermen frequently take advantage of introduced carp at a site along one of the Laguna lake-like areas. There is only very limited swimming activity at this site.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

The Laguna de Santa Rosa and Santa Rosa Plain Ecological Area is within the territorial jurisdiction of the State of California, and Sonoma County. The US Fish and Wildlife Service has jurisdiction over the migratory bird, and threatened and endangered species. NOAA has jurisdiction over Salmonids. Functional or management authority within the site areas are based upon ownership of the particular parcel of land within the sites. City of Santa Rosa, City of Sebastopol, Sonoma county Open Space and Agricultural district, Sonoma County Water, California Fish and Game, private landowners, and the Fish and Wildlife Service manage their own individual areas.

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

The Laguna de Santa Rosa Foundation will serve as the facilitator for the Laguna de Santa Rosa Wetland Complex. As the site is comprised of a number of public and private parcels this coordinated approach will best serve the interests of all.

Hattie Brown, Laguna de Santa Rosa Foundation, 900 Sanford Rd., Santa Rosa, CA 95401

Email: csloop@sfbayjv.org

Phone: (707) 334-3174

The responsible management entities for all parcels are:

Public parcels:

- California State Department of Fish and Game, 7329 Silverado Trail, Napa, CA 94599
- Denise Cadman, City of Santa Rosa Utilities, 4300 Llano Rd., Santa Rosa, CA 95407
- City of Sebastopol, 7120 Bodega Avenue, Sebastopol, CA 95472
- Karen Gaffney, Sonoma County Agricultural Preservation and Open Space District, 747 Mendocino Ave # 100, Santa Rosa, CA 95401
- Sonoma County Water Agency, 404 Aviation Blvd., Santa Rosa CA 95403

Private parcels:

- Christina Sloop, Laguna de Santa Rosa Foundation, 900 Sanford Rd., Santa Rosa, CA 96401
- Summerfield School, 655 Willowside Road, Santa Rosa, CA 95401
- Michael & Denise Pellagrini, 555 Rancho Caballo Ln, Santa Rosa, CA 95401
- Jana Niernberger, 672 Piezzi Road, Santa Rosa, CA 95401
- George Tuttle, 7900 Scotts Ter., Sebastopol, CA 95472
- John and Teresa Balletto, PO Box 2570, Sebastopol, CA 95473

- Paul and Patty Schoch, 335 Sparkes Rd, Sebastopol, CA 95472
- Daniel Warner and Tedi London, 5505 Lone Pine Rd, Sebastopol, CA 95472
- Finis Wilkinson, 5498 Bravo Toro Ln, Santa Rosa, CA 95401
- Donald Hanesworth, 3975 Timberlake Rd, Sebastopol, CA 95472

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

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Appendix A. Parcel List

Privately Owned Parcels			
Owner	Area (hectare)	x coordinate (feet)*	y coordinate (feet)*
John and Teresa Balletto	26.26312692420	6327633.13247	1913651.91203
Donald Hanesworth	2.02573208810	6335215.15629	1893939.71554
Laguna de Santa Rosa Foundation	0.73129063477	6327320.02473	1907835.77359
Laguna de Santa Rosa Foundation	1.14079616722	6327113.11945	1907985.00451
Laguna de Santa Rosa Foundation	0.23155651181	6327197.21330	1907529.65314
Laguna de Santa Rosa Foundation	1.44617592149	6327458.65616	1907464.43891
Jana Nierenberger	2.58518884574	6334257.28119	1918771.39781
Patricia Oconnell	4.81326244972	6322216.03740	1929452.62256
Michael and Denise Pellagrini	4.07794202847	6329134.74972	1918219.77314
Paul and Patty Schoch	21.84471173360	6321617.18570	1930466.93544
Summerfield Waldorf School	13.15352958930	6329798.53930	1924415.34175
Summerfield Waldorf School	2.42462830967	6330203.23960	1923781.03614
George Tuttle	10.10884848660	6320912.38417	1921508.91409
Daniel Warner	6.64143341888	6335709.48288	1895063.28230
Finis Wilkinson	3.41236891375	6328662.35673	1918233.70538
Publicly Owned Parcels			
Owner	Area (hectare)	x coordinate (feet)*	y coordinate (feet)*
City of Santa Rosa	4.54177492891	6341776.39133	1915299.99734
City of Santa Rosa	39.74502599150	6332257.46878	1916310.30160
City of Santa Rosa	2.01164358498	6329375.29218	1911042.32703
City of Santa Rosa	2.71405175514	6329027.60652	1910696.68087
City of Santa Rosa	24.03004684260	6329912.25789	1912758.77164
City of Santa Rosa	0.82155308795	6330905.02630	1913028.26338
City of Santa Rosa	18.38204634700	6330133.32257	1915564.82733
City of Santa Rosa	2.47334741335	6326401.27542	1919410.91911
City of Santa Rosa	3.04343822899	6343884.93104	1896441.17685
City of Santa Rosa	17.35200346370	6330809.32522	1912150.45273
City of Santa Rosa	0.62224958567	6329961.85361	1914294.12673
City of Santa Rosa	8.67674192355	6329175.23656	1912446.39284
City of Santa Rosa	49.97779374460	6324618.74301	1925649.73315
City of Santa Rosa	4.61661577964	6326081.61591	1917650.69980
City of Santa Rosa	61.00226440060	6340114.51716	1897537.57410
City of Santa Rosa	19.01543528460	6325886.46797	1918681.77162
City of Santa Rosa	25.76821493090	6330955.65352	1914338.73623
City of Santa Rosa	20.24378442690	6324654.43771	1918807.22025
City of Santa Rosa	0.22031608881	6325082.27225	1917822.90258
City of Santa Rosa	0.02497678227	6341159.54983	1926107.44049
City of Santa Rosa	0.56537122418	6345993.47342	1926640.27731
City of Santa Rosa	3.86242240409	6338199.09551	1907128.35243

City of Santa Rosa	30.01630470320	6342064.00979	1897044.77434
City of Santa Rosa	49.99091231650	6338093.35840	1905459.35471
City of Santa Rosa	122.8536228550 0	6335163.85572	1904171.36498
City of Santa Rosa	7.23114851338	6329496.17171	1915939.86175
City of Santa Rosa	13.52468087810	6329169.03229	1914225.58530
City of Santa Rosa	0.53917120406	6332261.26416	1911632.33922
City of Santa Rosa	6.23272174202	6335076.73723	1908909.84417
City of Santa Rosa	53.98828117740	6333967.99387	1910616.74211
City of Santa Rosa	4.05732976367	6337010.49689	1907050.33028
City of Santa Rosa	13.86323568540	6338959.59589	1898102.50636
City of Santa Rosa	20.32565969690	6339759.56715	1931462.43594
City of Santa Rosa	0.00969948158	6343894.63270	1927013.64385
City of Santa Rosa	9.35176412991	6340790.10858	1930773.86633
City of Santa Rosa	3.96894627617	6343475.59369	1898081.50582
City of Santa Rosa	2.99374303776	6343236.99149	1896425.57541
City of Santa Rosa	0.94566594562	6343036.28918	1896245.84576
City of Santa Rosa	3.93921769944	6343494.59515	1897771.87433
City of Santa Rosa	6.19156966895	6345611.50605	1911599.38589
City of Santa Rosa	0.06446530853	6351444.80550	1909118.09144
City of Santa Rosa	0.06632491678	6351563.54225	1909115.57417
City of Santa Rosa	122.5754130980 0	6330887.78712	1909192.29548
City of Santa Rosa	16.19819524270	6329562.73802	1910280.27932
City of Sebastopol	23.89880818940	6328096.48145	1911023.25252
City of Sebastopol	2.28156433974	6327301.03745	1910374.61116
City of Sebastopol	0.20517108229	6327138.32842	1909280.43946
City of Sebastopol	3.34764055299	6326794.10348	1908841.55254
City of Sebastopol	1.13868372917	6327066.59644	1911268.76601
City of Sebastopol	0.82541733363	6327359.68790	1908892.10354
City of Sebastopol	5.09805362919	6327570.25449	1909363.71265
City of Sebastopol	1.46416562338	6326867.68483	1910416.61333
City of Sebastopol	6.13166398567	6326858.32372	1911961.26577
City of Sebastopol	0.28498189744	6327054.61872	1911602.81961
City of Sebastopol	4.34060626526	6324642.38183	1917344.18289
City of Sebastopol	2.03601597298	6324542.14827	1917714.54940
Sonoma County Agricultural Preservation and Open Space District	8.53977763438	6355466.49237	1898936.90057
Sonoma County Agricultural Preservation and Open Space District	9.33856258111	6352157.14886	1895549.95042

Sonoma County Agricultural Preservation and Open Space District	1.35039917419	6351837.70511	1896197.11106
Sonoma County Agricultural Preservation and Open Space District	15.05082125470	6340196.57164	1918629.40908
Sonoma County Agricultural Preservation and Open Space District	54.82428747230	6339202.34439	1919888.42300
Sonoma County Water Agency	0.00496495002	6358269.47577	1884459.15108
Sonoma County Water Agency	9.38537375009	6337936.07812	1925397.17109
Sonoma County Water Agency	0.00032842576	6358295.02994	1884430.53104
Sonoma County Water Agency	1.82497767524	6357773.57652	1901671.71429
Sonoma County Water Agency	1.07960263909	6344081.93145	1928098.60173
Sonoma County Water Agency	5.86629027761	6334583.32918	1925090.98478
Sonoma County Water Agency	1.02031175050	6345579.65567	1929852.90568
Sonoma County Water Agency	0.21281752922	6344955.22365	1913270.16451
Sonoma County Water Agency	0.03436042618	6358481.47507	1884111.31133
Sonoma County Water Agency	0.77309730412	6338357.10456	1928145.16302
Sonoma County Water Agency	1.22213032105	6334577.94715	1928436.94791
Sonoma County Water Agency	1.88487578752	6331414.43531	1924903.60262
Sonoma County Water Agency	3.73018895232	6329428.59977	1925133.20081
Sonoma County Water Agency	1.24865335901	6363718.56312	1901463.11807
Sonoma County Water Agency	0.47991389842	6351097.54444	1909115.46119
Sonoma County Water Agency	0.52140803244	6358825.01739	1901666.94388
Sonoma County Water Agency	5.44563587143	6350323.35446	1892534.70488
Sonoma County Water Agency	1.58379403946	6351488.92384	1885423.40463
Sonoma County Water Agency	2.02088317044	6349906.73333	1885322.35636
Sonoma County Water Agency	6.71958679780	6347923.50333	1890979.35559
Sonoma County Water Agency	4.35166714110	6345333.15874	1892834.24960
Sonoma County Water Agency	3.39419108201	6344729.27327	1893805.77588
Sonoma County Water Agency	2.35127167535	6345815.64072	1892287.83211
Sonoma County Water Agency	0.47977603189	6351509.26750	1895174.04922
Sonoma County Water Agency	0.77582399337	6348828.56323	1904036.65829
Sonoma County Water Agency	2.74440695268	6344292.11605	1900624.66719
Sonoma County Water Agency	4.97465431992	6342120.19227	1895698.82419
Sonoma County Water Agency	8.50309411512	6340793.97944	1906972.23493
Sonoma County Water Agency	4.97493817951	6346899.54212	1902340.14655
Sonoma County Water Agency	1.15902448914	6351220.28888	1894558.19749
Sonoma County Water Agency	0.11613389833	6351370.73292	1895038.85918
Sonoma County Water Agency	0.93853891536	6344701.75604	1909290.19301
Sonoma County Water Agency	0.26508770599	6344694.37291	1908880.58162
Sonoma County Water Agency	0.11282224678	6317648.35553	1942984.09285
Sonoma County Water Agency	2.48039752711	6351955.72700	1896005.46907

Sonoma County Water Agency	0.10068428633	6358645.07455	1883809.25301
Sonoma County Water Agency	1.02376301587	6333722.95059	1927226.25003
Sonoma County Water Agency	14.17026275400	6325249.60155	1926223.19342
Sonoma County Water Agency	2.86156008620	6329300.77058	1924973.52571
Sonoma County Water Agency	5.00895221078	6353101.58641	1890951.26536
Sonoma County Water Agency	0.36543562421	6322410.67351	1925327.04102
Sonoma County Water Agency	1.06821141598	6339389.17952	1929575.32958
Sonoma County Water Agency	1.41664851422	6341931.13369	1926224.60261
Sonoma County Water Agency	1.30784605334	6343286.96145	1894437.45146
Sonoma County Water Agency	0.07363149032	6351490.59902	1894860.32151
Sonoma County Water Agency	1.10314932212	6354013.73798	1896926.90802
Sonoma County Water Agency	0.04980152668	6351447.83055	1894892.91583
Sonoma County Water Agency	3.12707414703	6360954.75440	1901531.90665
Sonoma County Water Agency	2.85792752489	6349811.28828	1905138.60978
Sonoma County Water Agency	1.35015765388	6353147.97519	1896590.60081
Sonoma County Water Agency	0.35114684976	6356881.09275	1885401.20017
Sonoma County Water Agency	1.11164768045	6346590.55688	1891523.88170
Sonoma County Water Agency	5.86114584482	6353309.99589	1889048.86806
Sonoma County Water Agency	0.73658119115	6351847.90523	1886269.90760
Sonoma County Water Agency	8.38616376789	6350823.83821	1890041.95049
Sonoma County Water Agency	1.28496915215	6344649.28888	1929071.11876
Sonoma County Water Agency	2.15686273113	6343372.88068	1926834.20627
Sonoma County Water Agency	1.05084316886	6344706.38398	1926896.62270
Sonoma County Water Agency	1.23349966597	6357827.17196	1902572.88467
Sonoma County Water Agency	0.12119256864	6351329.62554	1895092.73271
Sonoma County Water Agency	0.33110331245	6346223.22941	1925055.71768
Sonoma County Water Agency	0.16589731073	6338657.06673	1928745.28025
Sonoma County Water Agency	0.71373547998	6356341.38588	1885962.71782
Sonoma County Water Agency	1.58469549703	6358055.94980	1884553.93430
Sonoma County Water Agency	1.18803324760	6356141.71482	1886283.37934
Sonoma County Water Agency	3.70655157199	6343387.69986	1894589.02499
Sonoma County Water Agency	0.61454765509	6343192.04413	1899731.96707
Sonoma County Water Agency	8.05468009377	6332100.18013	1925444.40365
Sonoma County Water Agency	0.02841352326	6357392.15633	1884791.06471
Sonoma County Water Agency	0.09801035088	6340172.93473	1930310.25216
Sonoma County Water Agency	0.47480905452	6329228.31628	1915263.08265
Sonoma County Water Agency	1.89620135007	6344817.59926	1910668.78618
Sonoma County Water Agency	0.53183993142	6340699.48598	1928519.14784
Sonoma County Water Agency	2.85231394517	6334208.74889	1908912.33489
Sonoma County Water Agency	1.68649376875	6337456.69206	1904839.06831
Sonoma County Water Agency	2.64694211852	6355274.24386	1897789.08672
Sonoma County Water Agency	0.03572826165	6322767.85575	1938339.25066
Sonoma County Water Agency	3.09886389415	6350379.10007	1907579.06062

Sonoma County Water Agency	0.56777642542	6355959.81997	1901545.74899
Sonoma County Water Agency	0.27727110882	6357858.01376	1903389.63221
Sonoma County Water Agency	0.05737656635	6355099.89373	1904846.56754
Sonoma County Water Agency	0.17469196503	6340053.55696	1928306.96563
Sonoma County Water Agency	0.04592791581	6355080.29422	1903953.20312
Sonoma County Water Agency	0.01309415837	6344863.79007	1911700.78908
Sonoma County Water Agency	0.04171898827	6355101.59331	1905241.63931
Sonoma County Water Agency	0.29998778913	6355101.97735	1905539.32201
Sonoma County Water Agency	0.07565281138	6355100.71060	1905071.80122
Sonoma County Water Agency	0.03726202270	6355101.27208	1905172.30261
Sonoma County Water Agency	0.16276503022	6338569.44392	1927812.28898
Sonoma County Water Agency	0.05542235078	6355100.13138	1904743.97404
Sonoma County Water Agency	0.11752949779	6355100.47902	1904173.12952
Sonoma County Water Agency	1.10957385935	6355208.47989	1902199.02788
Sonoma County Water Agency	0.05730674313	6355100.05658	1904951.60254
Sonoma County Water Agency	0.75430167971	6339209.47090	1928135.82292
Sonoma County Water Agency	0.17463798331	6355100.28738	1904432.02102
Sonoma County Water Agency	0.46033296711	6355684.21120	1901183.79503
Sonoma County Water Agency	0.05889521191	6355100.23111	1904641.00931
Sonoma County Water Agency	0.22948825992	6351739.07369	1909115.11012
Sonoma County Water Agency	0.61248961962	6356765.73461	1901603.10047
Sonoma County Water Agency	2.40976474089	6356108.81328	1898647.25744
Sonoma County Water Agency	0.59167556517	6352259.49335	1909110.02758
Sonoma County Water Agency	1.25599448607	6355687.24242	1900339.07967
Sonoma County Water Agency	0.03300162487	6355080.37776	1903755.36175
State of California	8.50372254479	6344626.11259	1897846.48165
State of California	0.05976079419	6327656.76742	1909869.89776
State of California	31.56244355060	6331812.34714	1905565.08306
State of California	15.70569323310	6338234.01589	1920901.46546
State of California	27.73703385100	6345710.76231	1912661.64411
State of California	6.25817310178	6344720.00096	1896466.52720
State of California	0.80474895065	6325521.18815	1914379.01714
State of California	4.15731796629	6321435.80452	1922885.66295
State of California	3.49489488303	6325574.63281	1915457.10361
State of California	2.21186449376	6327373.99496	1910843.23826
State of California	1.36604131769	6323991.84570	1918835.04472
State of California	1.22787335581	6323240.90658	1919767.45371
State of California	3.75830674987	6322097.62983	1928858.59746
State of California	14.45804092910	6322051.21017	1921723.52638
State of California	2.63478262139	6322250.45751	1926126.52513
State of California	1.00026001078	6327441.00202	1911945.88222
State of California	16.09154021320	6321911.46343	1920263.94142
State of California	19.67215445250	6323239.29006	1920639.36818

State of California	0.11223966255	6323899.65872	1919648.34987
State of California	5.19279369187	6324904.73018	1916559.76251
State of California	14.75181174950	6344837.00182	1895558.02796
State of California	1.69906037155	6322376.66098	1920645.18992
State of California	0.22422280904	6322577.19272	1920951.54070
State of California	19.17238011140	6339524.16880	1903807.37389
State of California	57.37484525570	6331055.67485	1906903.42457
State of California	0.05481112008	6327265.91385	1911474.28193
State of California	3.95783557366	6330278.92822	1905961.05441
State of California	6.85846177602	6327807.05155	1908191.05409
State of California	9.66909190002	6337207.97863	1903527.46619
State of California	0.82626314663	6331523.53809	1911719.51749
State of California	13.71662160730	6345764.80394	1904839.43846
State of California	13.99038697300	6343561.43912	1904458.66892
State of California	3.64997299246	6355838.21376	1898085.87585
State of California	15.94030763070	6344542.09073	1904470.12527

*Geographic Coordinate System:

California State Plain FIPS code 402

Datum:

North American 1983 (NAD 83)

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